

NROD67

Psychobiology of Aging  
Tentative Syllabus 2016

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Lecture: Wed 1-3 pm in AC 332

Office Hours: Wed 11:30 to 1:00

Fascinating psychological and biological questions cluster around the phenomenon of development and aging. Indeed, various lines of research are helping us to understand the aging process.

In this seminar course we will explore the neurobiological changes that occur during the process of aging and the relationship between these neurobiological changes and the cognitive changes that are experienced in the aged. We will examine both normal age-related changes and the cognitive changes that occur in age related disease states. Some of the questions we will discuss in this course include the following. Does every species age in the same way as the human? Is there a fundamental process of “aging” common to all organisms? How does the aging process deviate from the “normal” to cause aging-related disorders in long-lived species? Can one prevent and/or modify the aging process? What roles do nature and nurture play in this process? Can we learn something from various human lifestyles, diets, cultures, environments and even from other species in order to enhance healthy aging? Indeed, the quest to maintain a healthy, long life by mankind has been going on from time immemorial. Past and current research has focused on beginning to answer some of these questions. As we progress through this course we will observe that advances in aging research are contributed by worldwide researchers who cut across many disciplines.

Text: There is no text book for this course. Instead you will read various journal articles on topics related to aging.

Grading Scheme:

25% Leading In-Class Assigned Readings

16% Short Thought Papers

20% Class Participation

9% Proposal

30% Final Paper

**Leading In-Class Assigned Reading Discussions**

Articles for the week are posted under course materials on BB. Each week a group of students will be responsible for presenting the articles to the class and facilitating

discussion of these articles. Each group should work together to come up with a good way to highlight the important issues discussed in the articles and to engage the rest of the class in a thoughtful and critical discussion of those issues. You will be graded on your ability to summarize/highlight the important issues in the articles, your presentation skills, your understanding of the readings, and your ability to lead and engage your peers in a group discussion. Your grade will be based on the group performance and your individual contributions. Each group is required to submit a near complete ppt of their presentation to me no later than Tues 11 am. Each student will lead 1 discussion during the term.

### **Participation:**

You are expected to read assigned papers before each class, attend regularly and be engaged in our class discussion. All course readings can be obtained through the course reading tab in BB. In addition, students will be required to submit a weekly thought question/idea/issue based on the assigned readings to our BB discussion board. This question/idea/issue must be posted no later than noon of the Tues prior to our Wed lecture. During the lecture some thought questions/ideas from the discussion board postings may be chosen for class discussion. You are not required to post an answer to the discussion board posting.

### **Short Reports:**

You will notice in the weekly list of assigned readings at the end of this syllabus there are 7 readings highlighted in blue. You are required to submit a thought/response paper based on 4 of these blue highlighted papers for evaluation during the term. At least 1 of the 4 must be submitted before reading week. It is your choice which papers you decide to submit. These papers should be a maximum of 1 page and are due at the start of the lecture in print. Late papers will not be accepted. Content related to the thought papers should not be included in the discussion board postings.

The two main purposes of these short written reports and the weekly discussion posting are to encourage you to 1) read the work in advance of the class and be prepared to discuss the papers during the seminar and (2) think about it. A good thought paper will demonstrate that you have read and thought about the readings in the course. The emphasis of the paper should be on some thought, idea, or criticism you have with respect to the material you read. You should identify some issue, and discuss that issue in light of the readings and/or the current research in the field. For example, you may choose to examine a problem with the assigned reading that could have been better addressed, try and extend the research based on current findings (what would be the next step), comment on how the paper integrates the findings with current developments in theories on the topic, or comment on the interpretation of the data analysis and statistical outcomes. Your goal is to clearly state your issue, and then express your thoughts on this issue. This should not be your opinion or viewpoint but should be based on scientific research.

## Proposal and Literature Review:

Each student will write a review paper on a topic approved by me. Approval for the final paper topic must be completed no later than Jan 27. Please email your topic choice to me no later than this date. A proposal will be required on Feb 24, which should include a detailed outline of the topic you will be focusing on and include a partial list of references. Each student will be required to meet with me individually on this date to discuss their progress. Your proposal will contribute 9% to your final grade.

The final paper will be no longer than 15 pages including the abstract, cover page, and reference pages. You are encouraged to be as concise as possible in this final paper while adequately covering the topic. Your paper should be double space with the only exception being that references may be single spaced. Late papers will be accepted but docked 10% per day unless a medical note is provided. Please use only the medical form available from UTSC online. Final papers are due at the start of class on March 23, 2016. You are required to bring a paper copy (double sided printing is acceptable) to class and also submit a copy through Turnitin. Details on Turnitin follow and will be discussed at the first class.

## Turnitin:

First, some background information on this program. Turnitin.com is a tool that assists in detecting textual similarities between compared works i.e.: it is an electronic resource that assists in the detection and deterrence of plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

*“Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site”*

Students will submit their final paper to the turnitin.com site ([www.turnitin.com](http://www.turnitin.com)). You may submit your paper as a docx or a pdf.

<http://www.turnitin.com>

To log in to our course on turnitin you will need the following information.  
Class ID: 11190668 Course Password: successful

## Tentative Course Schedule

DATE	TOPIC	READINGS
Jan 6	Course Introduction	
Jan 13	Neurobiology of Healthy Aging	Geldmacher 2012

		Erickson 2003 Imhof 2007
Jan 20	Models of Aging	Alexander 2012 Roberson 2012 Roth 2004 Kennard 2011 <b>Boyle 2013</b>
Jan 27	Models continued, AD introduced <b>Final Paper Topic must be approved no later than today.</b>	Engle 2012 Bizon 2012 Swerdlow 2011 Tampellini 2015 <b>Peelle 2013</b> old
Feb 3	No Class, Work on Paper Outline	
Feb 10	AD and MCI	Tampi 2015 Castanho 2014 Marchionni 2013 Brewer 2014 <b>Mufson 2016</b>
Feb 17	Reading Week- No classes	
Feb 24	<b>Final Paper Outline Due</b> Individual appointments scheduled	
Mar 2	Vascular Cognitive Impairments Cortical Changes	Jellinger 2013 Hinman 2007 Richards 2009 De la Torre 2004 <b>Wolkorte 2014</b>
Mar 9	Oxidative Stress/Chronic Stress and Nutrition and Aging	Gems 2008 Lupien 2005 Granzotto 2014 Christensen 2015 Joseph 2009
Mar 16	Nutrition and Aging Continued	Sinclair 2005 Huhn 2015 Kent 2014 Hsu 2014 <b>Scharaga, 2015</b>
Mar 23	Exercise and Aging <b>Final Paper Due</b>	Coubard 2011 Muscari 2010 McGregor 2013 Wei 2014 <b>Pons van Dijk, 2013</b>
Mar 30	Enrichment and Lifestyle	Hanna-Pladdy 2012 Sternberg 2013 Santos 2014 <b>Siwak-Tapp 2008</b>

## Readings:

Alexander GE, Ryan L, Bowers D, Foster TC, Bizon JL, Gelmacher DS & Glisky EL. Characterizing cognitive aging in humans with links to animal models (2012). *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2012.00021

Barberger-Gateau, et al. (2007). Dietary patterns and risk of dementia: the Three-City cohort study. *Neurology* 69: 1921-1930.

Bizon JL, Foster TC, Alexander, GE & Glisky EL (2012). Characterizing cognitive aging of working memory and executive function in animal models. doi: 10.3389/fnagi.2012.00019

Boyle PA et al. (2013). Relation of neuropathology with cognitive decline among older persons without dementia. doi: 10.3389/fnagi.2013.00050

Brewer G (2014). Alzheimer's disease causation by copper toxicity and treatment with zinc. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2014.00092

Castanho, TC et al. (2014). Telephone based screening tools for mild cognitive impairment and dementia imaging studies: a review of validated instruments. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2014.00016

Cotelli M, Manenti R, Zanetti O and Miniussi C. (2012). Non-pharmacological intervention for memory decline. *Frontiers in Human Neuroscience*. doi: 10.3389/fnhum.2012.00046

Christensen A & Pike CJ. (2015) Menopause, obesity and inflammation: interactive risk factors for Alzheimer's disease. *Frontiers in Human Neuroscience* doi: 10.3389/fnagi.2015.00130

Coubard et al. (2011). Practice of contemporary dance improves cognitive flexibility in age. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2011.00013

De la Torre JC (2004), Is Alzheimer's disease a neurodegenerative or a vascular disorder? Data, dogma, and dialectics. *Lancet Neurol*. 3(3): 184-190.

Edwards, JD. (2009). Cognitive enhancement for older adults. *Frontiers in Neuroscience* 3(1) 108-109.

Engle JR & Barnes CA (2012). Characterizing cognitive aging of associative memory in animal models. *Frontiers in Aging Neuroscience*.

doi: 10.3389/fnagi.2012.00010

Erickson CA & Barnes CA (2003). The neurobiology of memory changes in normal aging. *Exp Gerontol* 38(1-2): 61-69.

Geldmacher DS, Levin BE & Wright CB (2012). Characterizing healthy samples for studies of human cognitive aging. *Frontiers in Neuroscience*  
doi: 10.3389/fnagi.2012.00023

Gems K & Partridge L (2008). Stress-response hormesis and aging: “that which does not kill us makes us stronger”. *Cell Metab* 7:200-203.

Granzotto A & Zatto P (2014). Resveratrol and Alzheimer’s disease: message in a bottle on red wine and cognition. *Frontiers in Aging Neuroscience*.  
doi:10.3389/fnagi.2014.00095

Hanna-Pladdy B & Gajewski B (2012). Recent and past musical activity predicts cognitive aging variability: direct comparison with general lifestyles.  
doi: 10.3389/fnhum.2012.00198

Hinman JD & Abraham Cr (2007). What’s behind the decline? The role of white matter in brain aging. *Neurochem Res* 32(12): 2023-2031.

Huhn S, Masouleh SK, Stumvoll M., Villringer A & Witte V (2015). Components of a Mediterranean diet and their impact on cognitive functions in aging. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2015.00132

Hsu TM & Kanoski SE (2014). Blood-brain barrier disruption: mechanistic links between Western diet consumption and dementia. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2014.00088

Imhof A et al. (2007). Morphological substrates of cognitive decline in nonagenarians and centenarians: a new paradigm? *J Neuroscience*. 257(1-2): 72-79.

Jellinger KA (2013). Pathology and pathogenesis of vascular cognitive impairment—a critical update. doi: 10.3389/fnagi.2013.00017

Joseph J et al. (2009). Nutrition, brain aging, and neurodegeneration. *J Neuroscience* 29(41): 12795-12801.

Kennard & Woodruff-Pak (2011). Age sensitivity of behavioral tests and brain substrates of normal aging in mice *Frontiers in Aging Neuroscience*. Vol 3 Article 9  
doi: 10.3389/fnagi.2011.00009

Kent B (2014). Synchronizing an aging brain: can entraining circadian clocks by food slow Alzheimer’s disease? *Frontiers in Aging Neuroscience*.

doi: 10.3389/fnagi.2014.00234

Lupien et al. (2005). Stress hormones and human memory function across the lifespan. *Psychoneuroendocrinology* 30: 225-242.

Marchionni M et al. (2013). Inherited real risk of Alzheimer's disease: bedside diagnosis and primary prevention. doi: 10.3389/fnagi.2013.00013

McGregor KM et al. (2013). Effects of aerobic fitness on aging-related changes of interhemispheric inhibition and motor performance. doi: 10.3389/fnagi.2013.00066

Mufson, EJ et al. (2016). Braak staging, plaque pathology, and APOE status in elderly persons without cognitive impairment. [Neurobiology of Aging](#) 37 147-153.

Muscari A, Giannoni C et al (2010). Chronic endurance exercise training prevents aging-related cognitive decline in healthy older adults: a randomized controlled trial *International Journal of Geriatric Psychiatry* 25 (10), pg. 1055-1064

Peelle JE et al. (2013). Age-related vulnerability in the neural systems supporting semantic processing doi: 10.3389/fnagi.2013.00046

Pons van Dijk et al (2013). Taekwondo training improves balance in volunteers over 40. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2013.00010

Richards BA, et al. (2009). Patterns of cortical thinning in Alzheimer's disease and frontotemporal dementia. *Neurobiology of Aging* 30: 1626-1636.

Roberson et al. (2012). Challenges and opportunities for characterizing cognitive aging across species. *Frontiers of Neuroscience Aging*. doi: 10.3389/fnagi.2012.00006

Roth GS et al. (2004). Aging in rhesus monkeys: relevance to human health interventions. *Science* 305: 1423-1426.

Santos NC et al. (2014). Clinical, physical and lifestyle variables and relationship with cognition and mood in aging: across-sectional analysis of distinct educational groups. *Frontiers in Aging Neuroscience* doi: 10.3389/fnagi.2014.00021

Scharaga R, Holtzer R. (2015). Preliminary findings of the Brief Everyday Activities Measurement (BEAM) in older adults. *The Journal of Nutrition Health and Aging* 19:929-934

Sinclair DA (2005). Toward a unified theory of caloric restriction and longevity regulation. *Mech Ageing Dev* 126:987-1002.

Siwak-Tapp, CT et al. (2008). Region specific neuron loss in the aged canine hippocampus is reduced by enrichment. *Neurobiol Aging* 20:39-50.

Sternberg DA et al. (2013). The largest human cognitive performance dataset reveals insights into the effects of lifestyle factors and aging. *Frontiers in Human Neuroscience* doi: 10.3389/fnhum.2013.00292

Swerdlow RH (2011). Brain aging, Alzheimer's disease, and mitochondria. *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease*. Volume 1812, Issue 12, December 2011, Pages 1630–1639.

Tampellini D. (2015). Synaptic activity and Alzheimer's disease: a critical update. *Frontiers in Neuroscience* [doi.org/10.3389/fnins.2015.00423](https://doi.org/10.3389/fnins.2015.00423)

Tampi R.R. et al. (2015). Mild cognitive impairment: A comprehensive review. *Healthy Aging Research* 4:39

Wei G et al. (2014). Tai Chi Chuan optimizes the functional organization of the intrinsic human brain architecture in older adults. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2014.00074

Wolkorte R., et al. (2014). Increased reaction times and reduced response preparation already starts at middle age. *Frontiers in Aging Neuroscience*. doi: 10.3389/fnagi.2014.00079